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### DISCUSSIONS OF THE SESSIONAL WORKING GROUP: REVIEW OF THE CURRENT MARKET SITUATION AND OUTLOOK

#### Recent developments and short-term outlook in the tungsten market

Report by the UNCTAD secretariat

This report is mainly intended to provide a review of recent developments, along with an examination of the short-term outlook in the tungsten market. It covers the period 1989 and that part of 1990 up to the time the report was prepared (about mid-year). However, the coverage on some topics extends over a longer period to allow consistent analysis. The aim is to give as much background information as possible to the Sessional Working Group for its assessment of the current market situation and outlook as the tungsten market commences a new decade.

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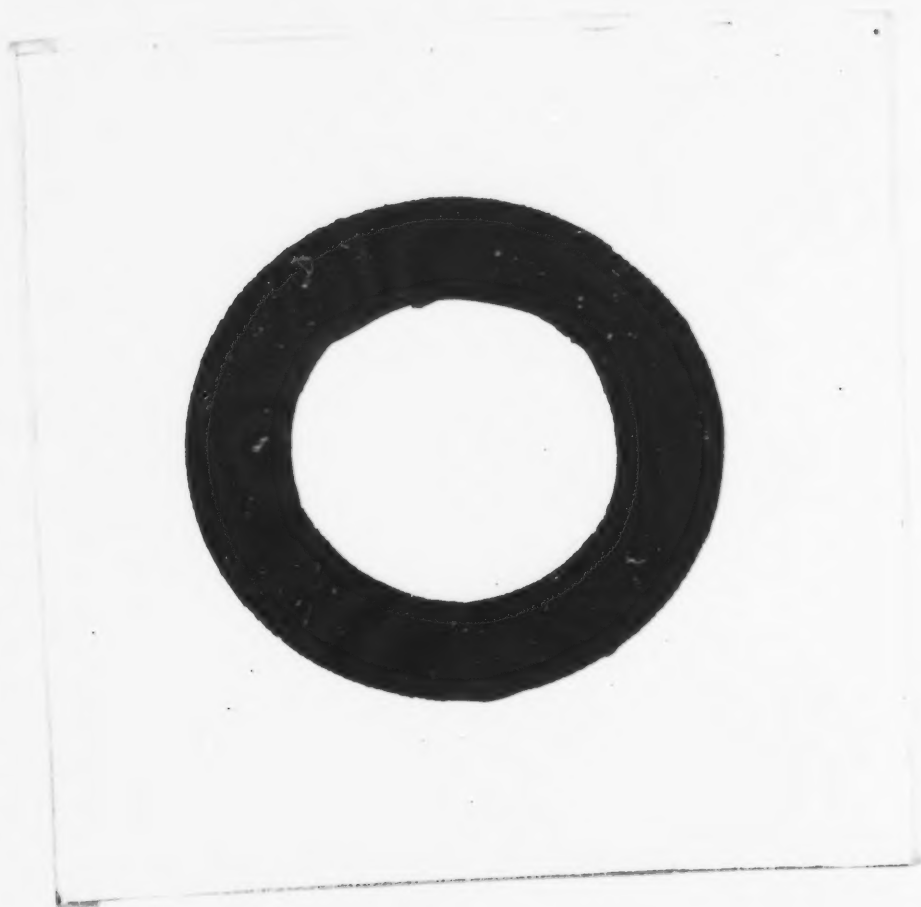
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## Chapter I

### SUMMARY AND CONCLUSIONS

1. The picture which emerges from recent developments in the tungsten market is one of increasing weakness with demand slow-downs in the major tungsten-consuming countries, oversupply of tungsten and an overhang of large accumulated stocks. As a result, tungsten prices have been rapidly losing any gains which they had made after the price collapse of 1985-1986.
2. Estimates for 1989 put total world consumption of ores and concentrates at 48,156 metric tons, an increase of 3.1 per cent, compared with 3.6 per cent in 1988 and 5.4 per cent in 1987. Imported intermediate products still affect consumption of ores and concentrates in many consuming countries but such effects vary greatly from country to country. For example, in Austria and the Federal Republic of Germany, plant facilities for processing tungsten concentrates have been scarcely affected while in France and the United Kingdom plants have been completely shut down. The latter countries rely more on imported intermediate products to remain competitive in the final product markets.
3. Total world mine production was estimated at 49,240 metric tons in 1989, up by 6.7 per cent over the increase of 12.6 per cent in 1988. Mine production fell sharply in 1987 when closures of mines reached a peak. The recent rise has been due to production increases in a number of countries including China, Mongolia and Viet Nam and the reopening of some mine capacities in, inter alia, Bolivia and the United States of America. With the exception of these few reopened mines, most of the closed down mines have remained shut.
4. Estimates of world consumption and production of ores and concentrates show a statistical surplus of supply over demand. This surplus is reflected in an accumulation of material in stock. Recent trends indicate that the surplus is likely to grow in 1990. Commercial stocks (those of producers, consumers, and dealers) rose by 45.7 per cent in 1989 compared to decreases of 30.8 per cent in 1987 and 7.4 per cent in 1988. The amounts of material sold from the United States strategic stockpile have shown little change but sales are expected to cease in the near future.
5. Trade in tungsten ores and concentrates measured by export shipments rose by 4.2 per cent in 1989, further to the increase of 3.6 per cent in 1988. The slow-down in consumption does not seem to have affected the volume of exports. Far more significant for the market have been the shipments of intermediate products, largely from China. Exports of intermediate products by China were estimated to total 12,000 metric tons in 1989 compared to 8,000 metric tons in 1988.
6. The over-abundant supply of material, increasing competition for market shares between suppliers of concentrates and intermediate products, and large overhangs of stocks and idle mine capacities have made tungsten prices more unsteady recently. The Metal Bulletin quoted wolframite as being traded at an average of \$US 49 per m.t.u. in the first five months of 1990, compared to \$US 57 per m.t.u. in 1989 and \$US 56 per m.t.u. in 1988. The International Tungsten Indicator (ITI) shows averages of \$US 58, \$US 61 and \$US 59 per m.t.u. respectively for the same periods.

7. As regards intermediate materials, ammonium paratungstate had been trading in a range between \$US 58 and \$US 59 per m.t.u. in Western Europe at the time of writing, compared to \$US 73 and \$US 74 per m.t.u. for the same period in 1988. It may be noted that price differentials between concentrates and ammonium paratungstate have narrowed recently. Meanwhile, the price gaps which once existed between APT prices in the United States and Western Europe following the implementation of the Orderly Marketing Agreement between China and the United States in 1987 have also shrunk considerably. As for ferro-tungsten, it has equally suffered from the over-supply situation in the tungsten market. However, a tighter supply as the market entered 1990 has led to firmer prices more recently. The material had recently been trading at between \$US 5.50 and \$US 5.60 per kg compared to \$US 5.15 and \$US 5.30 per kg during the same period in 1988.

8. With regard to the short-term outlook in the market, the analysis of recent developments indicates that demand for tungsten is expected to suffer setbacks, mainly due to economic slow-downs in major tungsten-consuming industries and a lower market offtake of tungsten. With demand losing momentum, the outlook for tungsten would then depend very much on the size of the supply, and, particularly, availability of competitive materials. In the face of a market already highly saturated with tungsten, tungsten prices are expected to remain weak, if not to deteriorate further in the immediate future.

9. In the longer-term, price prospects will depend on efforts to reduce over-supply, reflected in large shipments of both concentrates and intermediate materials. In the absence of effective measures to achieve a better balance between supply and demand, the market could face another price collapse and any major price recovery may have to await exhaustion of low-cost sources of supply. Meanwhile, the tungsten mines and plant facilities closed down between 1985 and 1987 are likely to remain shut.

## Chapter II

### REVIEW OF RECENT DEVELOPMENTS IN DEMAND AND SUPPLY IN THE TUNGSTEN MARKET

#### A. Introduction

10. The tungsten market has recently evolved in a situation with the world major economies experiencing some slow-downs following the upturns which began in 1987. In 1989, the world economy grew by 3.7 per cent compared with 4.3 per cent in 1988 (annex I). Some forecasts have predicted that the world economic growth rate would decline further in 1990 yet remain relatively steady, at an estimated 3.0 per cent compared to an average of 2.8 per cent for the 1980s.

11. In the 1980s, demand for tungsten had not generally kept pace with economic performance, particularly that of the earlier years. As a result, demand for tungsten significantly slackened over the decade, compared with the performance of world major economies. The actual world demand for tungsten was lower at the end of the decade than the level at the beginning. The weakness in the world demand for tungsten has been attributed to many factors including the recession in 1982-1983, structural and technological changes resulting from substitution, and technological progress in many areas such as in tool coatings and tool geometry which have affected tool requirements in recent years.

12. Whether the trends will continue through the 1990s remains to be seen but the effects of substitution as well as structural and technological change due to technological progress are expected to be more favourable to tungsten, taking into account its lower prices and greater availability compared with the situation in the early 1980s. However, the recent structural shifts in consumption and production are expected to remain a more permanent feature of the tungsten industry.

#### B. Tungsten consumption

13. The recent slow-downs in the major world economies have been reflected by weaker demand in the tungsten market. Many industrial activities which contributed to sustain the increased consumption of tungsten in 1987-1988 have recently either levelled off or declined, affecting demand in many consuming countries where consumption has begun either to stagnate or decrease.

14. The slow-downs in activity were significant in a number of sectors, including metal-working, automotive and construction industries. Although growth remains strong in some industries - including aerospace and certain sectors of electronics - effects on demand are far outweighed by the lower performance in the other manufacturing sectors meaningful for tungsten consumption. Demand in the oil and gas industry, which accounts for over a tenth of tungsten consumption, has been relatively more stable recently. The decline in output in developed countries including Canada and the United States has been compensated by steadier production in other countries. On the other hand, tungsten consumption for defence applications has been weakening recently, a trend likely to be accentuated when the substantial cuts in defence budgets proposed by the major powers are implemented although the actual time for such cuts seems to be still far off. 1/

(1) Consumption of ores and concentrates

15. As shown in annex II, consumption of tungsten ores and concentrates rose for the third consecutive year; the 1989 rise of 3.1 per cent brings consumption up to 48,156 metric tons. The 1987 increase was 5.4 per cent compared to 3.6 per cent in 1988. However, most of the increases occurred only in China and the Republic of Korea, while in major consuming countries, consumption of ores and concentrates levelled off or decreased, bringing to an end the demand upturns which began in 1987.

16. In the developed market-economy countries, consumption of tungsten ores and concentrates fell by nearly 11.5 per cent, amounting to 14,575 metric tons, compared with 16,476 metric tons in 1988; this was about equal to the level in 1987. The recent drop in the consumption of ores and concentrates appears to have been due more to weakening demand in the market rather than to any further inroads made by imported intermediate materials. The substitution of imported intermediate products for ores and concentrates has already by-and-large taken place in areas of the market where such substitution is commercially and industrially viable. Greater obstacles, including the more integrated structure of the remaining domestic processing-plant facilities and higher trade barriers such as anti-dumping duties, seem to render further inroads by imported intermediate products more difficult.

17. Among the developed market-economy countries, consumption of ores and concentrates in 1989 fell principally in Austria (14.3 per cent) and Japan (22.3 per cent), and totally or virtually ceased in France and the United Kingdom. Most of the intermediate plant facilities in Western Europe are now concentrated in Austria and the Federal Republic of Germany, which appear to have withstood better the competition from imported intermediate products. In the United States, consumption of ores and concentrates fell by 1.5 per cent following the successive increases of 42.2 per cent in 1988 and 14.6 per cent in 1987.

18. In contrast, consumption of ores and concentrates of the developing countries rose by 25.1 per cent in 1989 to reach 3,281 metric tons compared with a decrease of 18.0 per cent in the previous year. The amounts of consumption remained small in these countries except in the Republic of Korea where most of the increase had occurred. With the expansion of downstream facilities, the latter country consumed the larger proportion of its own ores and concentrates for making intermediate and higher value-added products. It would seem that the Republic of Korea may also have recently imported intermediate material for domestic processing. Consumption of ores and concentrates in the Republic of Korea rose by over 45.0 per cent, which more than compensated for the fall of 19.0 per cent in 1988. Limited domestic demand and difficulties of market access in the major consuming countries are among the contributing factors limiting downstream processing of tungsten ores and concentrates in the other developing countries.

19. In Eastern Europe, consumption is usually considered as steady but the recent economic slow-downs in these countries which are now moving towards a more market-oriented system may have also affected consumption of tungsten. Total consumption in the USSR is estimated at 15,000 metric tons per annum.

The slow-downs of the Soviet economy and the changing structure in the Soviet industry point towards a decrease. 2/ Available information also shows that in Poland demand for ores and concentrates has been declining in recent years as a result of expenditure cutbacks due to austerity measures in the industrial and mining sectors. Its consumption of ores and concentrates was estimated at 100 metric tons in 1989 compared to 424 metric tons in 1988 and 744 metric tons in 1987.

20. One major recent development to be noted in the tungsten market is the fast expansion of consumption of ores and concentrates in China. This expansion could be attributed mainly to the rapid development of plant facilities, particularly for making ammonium paratungstate, sodium tungstate, tungsten trioxide and tungstic acid, which have accompanied the economic reform policy and the national policy to increase exports of higher value-added products. China's consumption of ores and concentrates was estimated at 13,000 metric tons in 1989, 3/ indicating an estimated growth rate of over 25 per cent per year since 1985. More processing facilities have enabled China not only to meet the rising domestic demand but also to emerge as a major supplier of intermediate products and some finished products such as carbide tools and drilling bits. However, its share of the world market for the latter category of products is still quite limited, largely due to difficulties of market access.

21. Information for 1990 is still scant at the time of writing. An assessment of market prospects for consumption is thus hard to make but it appears that the trends point towards a decrease according to available figures for the first quarter of 1990. Consumption has been estimated provisionally at 48,000 metric tons, on the assumption that consumption in China will remain around its present level.

#### (2) Consumption of tungsten scrap

22. Consumption of tungsten scrap appears to affect demand for ores and concentrates less now than at the beginning of the 1980s when recycling facilities were expanded rapidly, with the introduction of new recycling techniques, including the zinc process. The abundant supply of primary materials and prevailing low prices in the tungsten market, coupled with the more limited market outlets for recycled materials, have softened consumption of scrap.

23. Available information shows that consumption of tungsten scrap has not made any further significant advance on the market and in some cases has even tended to decline. In Japan, the use of recycled tungsten is limited and is expected to remain insignificant. In the United States, no major development in the consumption of recycled tungsten has been reported recently where there appears to be still excess recycling capacity. The United States' consumption of tungsten scrap is estimated at about 23 per cent of total tungsten consumption in recent years. At this level, consumption of tungsten scrap is some way off from forecasts made several years ago. 4/ Little information is available on the scrap recycling industry in Western Europe but it also seems to be affected by an excess in capacity and low tungsten prices. There has been little investment for any expansion in recycling capacity.

### C. Supply of ores and concentrates

#### (1) Mine production

24. Perhaps the most significant development in the tungsten industry during recent years is the closure of many of the tungsten mines which were still producing substantial quantities of ores and concentrates at the beginning of the 1980s. This development has been attributed to a number of factors, including the low demand for tungsten in consuming countries, declining tungsten prices and the increased competition from imported intermediate materials. The period 1985-1987 coincided with the largest closure of tungsten mines in recent years. Although the shutdown of mines has abated, few such mines have since been rehabilitated. Meanwhile, in some countries production has increased, particularly in China, leading to a major structural shift in production.

25. In 1989, total mine production had been estimated at 49,240 metric tons, compared with 46,154 metric tons in 1988 (annex III). With the recent increases, production of ores and concentrates was back to the level reached before the price collapse of 1985 and 1986 which led to the large-scale closure of tungsten mines. As a result production fell to less than 41,000 metric tons in 1987, the lowest level in the decade, even lower than that reached during the recession of 1982-1983.

26. Despite better demand conditions, particularly between 1987 and 1988, there has been no substantial reopening of the closed-down mines because current tungsten prices are such that the mines operation would not break even with production costs. Increased demand has been satisfied by mine production from other sources. With any prospects of significant price improvement still receding at the time of writing, the likelihood is that most of the closed mines will remain closed, at least for the time being. Between 1980 and 1989, the number of mines in operation had dropped from 59 to 10 in the developed market economy countries and from 69 to 30 in the developing countries (annex IV).

27. In 1989, mine production of the developed market-economy countries showed little change; it was estimated at 5,323 metric tons, about the same level as in 1988 but there were great differences in performance between countries. Production increased in Australia from 1,261 metric tons to 1,350 metric tons and in the United States from 360 metric tons to 450 metric tons. The Curtis Tungsten mine in California was reported to have opened recently. 5/

28. In most other developed market-economy countries, there was little change, with production still affected by closed-down mines. With the closure of its single mine at the beginning of 1989, Sweden joined Canada, France and the United Kingdom among the developed market-economy countries which had recently ceased production of ores and concentrates. The shutdown of many tungsten mines in the European Economic Community and the threat of further mine closures recently bolstered the argument in favour of the introduction of protectionist measures so as to reduce tungsten imports. The measures subsequently adopted have taken the form of anti-dumping duties and affect not only tungsten concentrates but some other tungsten products as well. 6/

29. Production of ores and concentrates in the developing countries was largely by-passed by recent demand upturns. Production totalled 5,867 metric tons in 1989, about the same level as in the previous year. Decreases occurred mainly in Mexico and Peru where production fell by 17.0 per cent and 51.4 per cent, respectively. The sharp fall in Peru was due to low tungsten prices and domestic problems faced by the mining sector. However, these decreases were more than compensated by increases in Bolivia (21.0 per cent), Brazil (6.9 per cent) and the Republic of Korea (5.3 per cent). The Republic of Korea is by far the largest producer of tungsten ores and concentrates among the developing countries and its mine production has recently been also affected by availability of lower-priced ores and concentrates which have been imported to replace partly the more expensive domestic ores and concentrates. In Bolivia, tungsten mining benefited from the generally better climate in the mining sector following the introduction of new investment policies.

30. Estimates of mine production in China have recently been revised upward on the basis of developments in domestic consumption as well as exports of tungsten materials. Its production of ores and concentrates was estimated at 25,000 metric tons in 1988 and 28,000 metric tons in 1989, compared with 20,000 metric tons in 1987. The recent increases are reported to be due mainly to "mincai", which has been translated as farmers' production. 7/ As not only individual farmers appear to be involved in such production, which was put at an annual rate of 7,000 to 10,000 metric tons in 1988 and 1989, such a translation would seem to be inadequate.

31. With the opening of additional mine capacities, estimates of mine production in Mongolia have also been revised upward, to 2,000 metric tons annually in 1988 and 1989, compared to 1,500 metric tons earlier. Some mine production has also been reported from Viet Nam, for an estimated current figure of about 300 metric tons a year.

32. On the basis of the limited data available at the time of writing, it is difficult to forecast production for 1990. The indications are that the developed market-economy countries and the developing countries will see little change in their production from the current level although some increases may be expected in a number of countries including Bolivia, Portugal, Spain and the United States. Whether Portugal or Spain are likely to benefit from the recent anti-dumping duties remains to be seen. However, the key variable remains China. If its production stays at current levels, total mine production would likely exceed 49,000 metric tons. However if measures recently taken to ban "mincai" production are successfully implemented, mine production in China may be substantially reduced.

## (2) Assessment of stock movements

### (a) Commercial stocks

33. Economic slow-downs, coupled with supply inelasticities and low tungsten prices, have led to an increase of stocks clogging the market. The full extent of such stocks is not known but it is generally recognized that it is more significant than recorded statistics would suggest. Theoretically, the change in stock levels of tungsten ores and concentrates is equal to the balance between production and consumption of ores and concentrates, which showed a surplus for 1989.

34. According to available information, the levels of stock of ores and concentrates held by producers, consumers and dealers (commercial stocks) increased by 45.7 per cent, compared to decreases of 30.8 per cent and 7.4 per cent, respectively, in 1987 and 1988 when there were substantial stock drawdowns in response to stronger market demand. The quantities of commercial stocks of tungsten ores and concentrates were high with the market facing further increases if production adjustments remained limited while consumption continued its slow-down.

35. In volume terms, producers' stocks showed wider fluctuations. The reduced level of working stocks resulting from mine closures and strong demand upturn towards the end of 1987 led to a 35.8 per cent drawdown in producers' stocks that year. However, more recently the increased mine production and slow-downs in market offtake has led to a build-up of producers' stocks. The end-of-year producers' stocks rose by 13.4 per cent in 1988 and by 23.6 per cent in 1989. The largest producers' stocks were held by Australia, Portugal and Thailand.

36. The available information shows that consumers' stocks of tungsten ores and concentrates rose sharply, mainly attributable to the more than five-fold increase in the United States. Such stocks also rose by 23.3 per cent in Japan, mainly as a result of softening demand in the end-use sectors and increased consumption of imported intermediate materials. In the other major consuming countries, consumer's stocks continued to be affected by the closure of processing facilities. As for dealers' stock, the tonnages reported showed a small increase in Thailand from 51 metric tons to 56 metric tons.

37. The only figures available on stocks of intermediate products are those published by the United States Bureau of Mines. Since the reopening of plant facilities has levelled off, producers' and consumers' stocks of ammonium paratungstate have remained at a more stable level. The end-of-year total of such stocks amounted to 909 metric tons in 1989, as compared to 911 metric tons in 1988.

(b) Non-commercial stocks

38. The only information available on a regular basis concerning non-commercial stocks is on stockpile materials held by the United States Defence Logistics Agency (DLA). A number of other countries are also known to hold non-commercial stockpiles but there was little information available. Stockpiles of tungsten, in one form or another, are reported to exist, for example, in France, Japan and Sweden. 8/

39. Recently, the United States DLA release has consisted mainly of non-stockpile-grade materials to support the ferro-alloy upgrading programme. In the first nine months of 1989 (annex VI), some 339 metric tons of such materials were sold; contracts for the sale of 278,959 lbs. of the material were reported. 9/ This quantity completed the tungsten sales authorized for fiscal year 1989. The total of DLA sales amounted to 466 metric tons for the whole year and no sales have been reported so far for 1990.

40. As of the end of September 1989, the total defence inventory for tungsten ores and concentrates stood at 34,634 metric tons compared to 35,100 metric tons in 1988. Recently, a proposal was recommended by the Department of Defence to the United States Congress for increasing the reserves of tungsten in the National Defense stockpile from existing requirements of 50,666,000 lbs. to 70,900,000 lbs. 10/ If the proposal is implemented, it would virtually eliminate stockpile sales by the United States.

D. Developments in mine capacity

41. Mine capacities based on the definitions used by the United States Bureau of Mines are shown in annex VII. 11/ It may be noted that despite the weak market situation, tungsten mine capacity has remained high which indicates a low rate of capacity utilization in the tungsten mining sector. This low rate of capacity utilization creates a considerable overhang of idle mine capacities ready to reopen if the market price were to improve from the current depressed conditions.

42. In 1988, the greatest disparity between mine production and mine capacity was found in Canada and the United States, where the ratios of mine production to mine capacity were, respectively, nil to 3,300 and 450 to 3,700. Of the other countries, Australia and the Republic of Korea also recorded large differences between mine production and mine capacities.

43. Despite decreases of mine capacity in the developed market-economy countries and the developing countries, the total world mine capacity was estimated to amount to 59,000 metric tons in 1988 compared to 58,000 metric tons in 1984. The fact is that the decreases were largely compensated by expansion outside these countries, principally in China. Production capacity in China, Mongolia and Viet Nam was estimated at some 27,500 metric tons compared to 19,000 metric tons in 1984 and 12,200 metric tons in 1979.

44. With tungsten prices at low levels and large idle capacities there was little market incentive to invest in new mine capacities. A number of feasibility studies had been undertaken for the development of new mines in the early 1980s; since then market conditions have changed so radically that most of the development projects were either postponed or abandoned. However, investments in new capacity appear to have been made in China, Mongolia and Peru (annex VIII). Recently India has shown some interest in expanding domestic mine capacities, with a view to achieving greater integration in its tungsten industry.

### Chapter III

#### DEVELOPMENTS IN TUNGSTEN TRADE

##### A. Introduction

45. Perhaps the most significant development in the international trade of tungsten in the 1980s was the emergence of increasing shipments of tungsten products from concentrate-producing countries, as they integrated mine production with downstream processing. The availability of large domestic tungsten resources, coupled with the economic reform policy to achieve greater integration and product diversification in the mining sector, has made China the larger exporter among these countries. However, most of its exports consisted of lower-value products, particularly ammonium paratungstate, tungsten oxide and ferro-tungsten. Plant capacities for processing tungsten concentrates into upgraded products in China are currently estimated at 10,000 to 15,000 metric tons.

46. Another significant development closely associated with the above change was the over-supply situation which had characterized most of the 1980s. The over-supply situation led to price-cutting competition for market shares between suppliers of concentrates as well as between suppliers of concentrates and intermediate materials, resulting in the collapse of tungsten prices in 1985 and 1986. The effects, which have continued to be felt to this day, include the large-scale closure of mine and plant capacities in many countries and the increasing pressure that is being exerted by interest groups in some of these countries seeking protective measures.

##### B. Trade in ores and concentrates

47. The availability of cheap intermediate materials and price-cutting competition between suppliers have led to major cut-backs in the trade of ores and concentrates, which reached a peak in 1986 and 1987. However, the trade of ores and concentrates has recently shown greater stability, due mainly to the advantages enjoyed by some domestic plants in meeting customers' requirements in terms of quality specification and delivery and in some cases also as a result of measures taken to protect domestic plants from further shut-downs. There still remain many closed-down plants in importing countries which are unlikely to reopen at the prevailing prices of intermediate materials. In these countries, imports of ores and concentrates would continue to be affected by imported intermediate products.

48. In 1989, total world imports of ores and concentrates were estimated at 24,300 metric tons compared to 24,981 metric tons in 1988 (annex IX). With the continued strong performance in the engineering and tool sectors, imports into the Federal Republic of Germany had risen by 3.6 per cent further to the increase of 19.2 per cent in 1988 but this strong performance of imports was more than neutralized by decreases in Austria (25.8 per cent) and Japan (26.2 per cent). Imports into the United States have become relatively stable following the substantial increases after the implementation of the Orderly Marketing Agreement with China in 1987. Total United States imports amounted to 7,895 metric tons in 1989, compared with 8,045 in the previous year.

49. Some increases in imports were also recorded by Hong Kong, and as the latter country does not consume tungsten concentrates, most of the material is intended either for re-export or for the build-up of stocks. In Poland, estimates show that imports also staged an increase following the sharp downturns in 1987 and 1988, when the total imports of ores and concentrates had dropped by 41 per cent and 43 per cent, respectively. There was also an increase of 22.2 per cent in Swedish imports, partly to compensate for domestic production which had ceased altogether with the closure of its single mine.

50. As regards exports, estimates showed an increase of 4.2 per cent further to the increase of 3.6 per cent in 1988. The slow-down of consumption in many consuming countries did not seem to have affected the volume of exports and some buyers took the opportunity of lower prices for stock replenishment or build-up which helped to raise export shipments. Exports increased principally from Bolivia (23.9 per cent), China (14.4 per cent) and Thailand (15.0 per cent) but decreased from Australia (9.1 per cent) and Portugal (4.3 per cent). Exports from Mexico also increased by 4.8 per cent although it is a small exporting country with a total export of only 177 metric tons in 1989. In view of unremunerative ore prices, exports from the Republic of Korea had virtually ceased and it may well emerge as a net importer as domestic plants rely more on imported feedstuff to replace locally produced concentrates as they become relatively more expensive with rising mining costs.

51. Based partly on estimated data, China, Mongolia and Viet Nam accounted for over two thirds of the total exports of ores and concentrates in 1989. Exports from China amounted to 14,703 metric tons according to China's customs statistics while exports from Mongolia and Viet Nam were estimated at 2,000 metric tons and 200 metric tons, respectively.

#### C. Trade in intermediate tungsten products

52. In the 1980s, efforts to establish plant capacities for processing concentrates into higher value-added products for export by ore-producing countries made progress mainly in China and the Republic of Korea. Slow-downs in tungsten consumption, higher production costs, limited market access and unremunerative prices were among the factors which hampered the development of downstream processing capacities in most other ore-producing countries. The only APT plant in Australia was reported to have been shut down recently and Brazil has virtually ceased exporting any processed products except small amounts of tungsten wire and powder products.

53. Despite difficult market conditions, the rise of China to the status of a major exporter of tungsten products has been a significant structural change in the world tungsten industry. In the early 1980s, Chinese exports of tungsten products amounted to only a few hundred metric tons, consisting mainly of the lower value-added products. By 1985 and 1986, such exports had already reached about 4,000 metric tons. With further expansion of processing capacities, Chinese exports of tungsten products had achieved an estimated total of 8,000 metric tons in 1987. The exports of intermediate products by China expanded even more rapidly in the next two years to reach some 13,000 metric tons in 1989. Although the main export products remain ammonium paratungstate ferro-tungsten and other lower value-added products, there have also been some efforts towards diversification by including higher value-added products. But Chinese exports of such products including tungsten powder, tungsten carbide, tungsten wire products, tungsten tools and drilling bits are still limited.

54. The above developments have transformed the pattern of trade in intermediate tungsten products. The established exporters of such products as ferro-tungsten and ammonium paratungstate have found their exports sharply curtailed and, in a number of cases, they even become net importers. This is so, for example, in France, Portugal and the United Kingdom in the trade of ferro-tungsten. There has also been a rapid growth of re-export trade in these materials which has benefited such countries as Hong Kong and the Netherlands.

55. However, trade in higher value-added tungsten products still largely consists of intra-trade among the developed market-economy countries, which are simultaneously importers and exporters of different grades of the same product. Thus, the Federal Republic of Germany both imports and exports important quantities of ammonium paratungstate, while the United States import and export important quantities of ammonium paratungstate and tungsten carbide. Estimates based on available data show that in 1989 the combined exports of Austria, France, the Federal Republic of Germany, Japan, Sweden, the United Kingdom and the United States rose only by 0.4 per cent to reach a total value of \$US 273 million and their imports increased by 9.4 per cent to reach \$US 249 million. Of these countries, Austria, the Federal Republic of Germany and the United States were net exporters while France, Japan, Sweden and the United Kingdom were net importers.

#### D. Protective barriers against imports

56. Recent market conditions have posed increasing difficulties for the survival of the tungsten industry in a number of consuming countries. Such difficulties arise from slowing demand, competitive offers of low-priced materials, unremunerative prices in relation to production costs and the threat of further mine and plant closures. As a result, there has been mounting pressure for protective measures from many sections of the industry. The pressure led to the implementation of the Orderly Marketing Agreement between China and the United States in 1987. This agreement imposes import limitations on Chinese ammonium paratungstate and tungsten oxide. 12/

57. Similarly, increasing pressure in Western Europe led to the adoption of anti-dumping duties by the European Economic Community against certain Chinese imports in April of 1990. The duties consist of 33 per cent on tungsten carbide powder, 35 per cent on tungstic acid/oxide, 37 per cent on tungsten ore supplied by CNIEC (China National Non-Ferrous Metal Import and Export Corp.), and 42.4 per cent on ore from other supplies, including Minmetals. 13/

58. There are three aspects in the anti-dumping duties which strike attention. First, ammonium paratungstate and tungsten powder are not included on the list. Secondly, the anti-dumping duties show what may call a reverse duty scalation with, for example, tungsten carbide powder (a higher value-added product) subject to a lower rate than tungsten ores. Thirdly, the Chinese ores are differentiated by their origin. The duties are imposed provisionally for four months, which may be extended for another two months when the Council of the European Economic Community will have to agree before they become definitive. Meanwhile, it is understood that efforts are being pursued to reach some compromise between the interested parties.

## Chapter IV

### PRICE DEVELOPMENTS IN THE TUNGSTEN MARKET

#### A. Prices of tungsten ores and concentrates

59. The pressure of increased exports of both concentrates and intermediate materials and slow-downs in demand are two determinant factors which have influenced market prices recently. Notwithstanding the Chinese export licensing system in place since 1987 and the producers' meetings in Changsha and Sydney aimed at strengthening tungsten prices, little seems to have been achieved to bring the level of exports more in line with market demand. The pressure of abundant offer in the face of lower market offtake, particularly of lower-grade materials, has resulted instead in a price situation that reflects an overwhelming excess of exports.
60. On the basis of Metal Bulletin quotations, wolframite was trading at an average price of \$US 49 per m.t.u. in the first five months of 1990, compared with \$US 57 per m.t.u. in 1989 and \$US 56 per m.t.u. in 1988. The International Tungsten Indicator (ITI) had also reported a similar weakening price situation with prices of tungsten concentrates averaging \$US 58, \$US 61 and \$US 59 per m.t.u., respectively, for the same periods. At the present level, the price of tungsten ores and concentrates has, in effect, lost virtually all the gains achieved in the recovery from the price collapse of 1985-1986 and is among the weakest in the mineral and metal sector (see figure).
61. The spillover of strong demand into 1989 had maintained the price of ores and concentrates at a stable level despite large supplies. Wolframite was traded in the range of \$US 55 and \$US 65 per m.t.u. with the price difference between the low and high grades varying little for most of the period January-April 1989. However a decreased market offtake due both to demand slow-downs and lower rates of stock replenishment exerted pressure on prices. The price of ores and concentrates began to fall, particularly for low-grade materials, which widened the price differential between lower and higher grade materials. At the time of the autumn Canton Fair, the price range had dropped to \$US 46 - \$US 61 per m.t.u., leaving a price spread of \$US 15 per m.t.u., which amounted to a significant premium for the higher-grade concentrates. Owing to a lack of buyers' interest <sup>14/</sup> in an over-supply market, the price of ores and concentrates continued to slide and the price spread widened further as indicated below.
62. The market entered the 1990s with prices, already at bottom levels appearing to face further weakening. Wolframite prices were quoted between \$US 41 and \$US 50 per m.t.u. in January 1990, compared to an average range of \$US 44 - \$US 60 per m.t.u. in the last quarter of 1989. Further set-backs in February-March 1990 brought wolframite prices down to \$US 39 - \$US 57 per m.t.u. Although more recently there has been a limited improvement in the prices of higher-grade materials, the prices of lower-grade materials have remained at their low levels, a situation which tends to increase the price differences between the higher and lower-grade materials. At one time, such differences exceeded \$US 20 per m.t.u. which was considerable in terms of the prevailing price range.

63. As regard scheelite, prices have also been influenced by the weakness in the tungsten market but a relatively stable demand in the steel industry, better suppliers' discipline and quality premiums have maintained scheelite prices at more stable levels. Scheelite prices started 1989 with a price range of between \$US 57 and \$US 69 per m.t.u. which further improved to between \$US 60 and \$US 74 per m.t.u. by mid-1989. However, for reasons indicated earlier, the tungsten market weakened in the latter part of 1989, affecting the prices of all tungsten materials, including that of scheelite which was brought down to an average range of \$US 57 to \$US 73 per m.t.u. in the last quarter of the year. With a continued low market offtake, scheelite was offered at prices of between \$US 56 and \$US 72 per m.t.u. as the tungsten market entered 1990. At the time of writing, the price of scheelite had further weakened to \$US 54 to \$US 70 per m.t.u.

64. Meanwhile, both the Metal Bulletin and the International Tungsten Indicator have to be satisfied with smaller tonnages to formulate their quotations as a result of the decrease in market offtake and fewer sales contracts reported. The Metal Bulletin quotations for wolframite and scheelite were formulated on an average tonnage of 290 metric tons and 110 metric tons per month, respectively, compared to 760 metric tons and 144 metric tons in 1988.

#### B. Prices of intermediate tungsten products

65. With intermediate tungsten products now accounting for well over a third of total world exports, their availability in the market has a strong influence on the structure of tungsten prices. Prices are determined more by the quantities on offer rather than in relation to the prices of ores and concentrates as was the case when intermediate products were converted from imported concentrates in the major consuming countries. As a result, the price differences between tungsten ores and concentrates and intermediate products have considerably narrowed, largely owing to the competitive offer of materials on the market. Attempts to maintain a relationship between tungsten concentrates and ammonium paratungstate have been largely unsuccessful. 15/ In 1990, up to the time of writing, the differential between the average prices of concentrates and ammonium paratungstate was about \$US 13 per m.t.u. compared to a differential of \$US 17 per m.t.u. in 1988 and \$US 20 per m.t.u. in 1987. Such differentials are wider if lower-grade materials are taken for comparison since a wider price spread exists between the higher and lower grade of the materials. The decreasing price differentials would suggest an increase in market competition as demand slows down.

66. Demand upturns and the Orderly Marketing Agreement (OMA) between China and the United States led to firmer APT prices as the United State market entered 1988. APT materials were traded between \$US 81 and \$US 82 per s.t.u. (\$US 89 and \$US 90 per m.t.u.) compared to \$US 70 per m.t.u. at the start of 1987. However, increased supplies including tungsten concentrates and intermediate products particularly tungsten oxide and sodium tungstate considerably dampened further price improvements despite strong demand. At the start of 1989, APT materials were available in a range of between \$US 79 and \$US 80 per s.t.u. (\$US 88 and \$US 89 per m.t.u.). Demand downturns coupled with an over-supplied market led to price decreases

for most of 1989 with ammonium paratungstate being offered at between \$US 60 and \$US 61 per s.t.u. (\$US 66 and \$US 67 per m.t.u.). There was little improvement in 1990 and recently APT prices were quoted at between \$US 59 and \$US 60 per s.t.u. (\$US 65 and \$US 66 per m.t.u.).

67. In Western Europe, APT prices have not followed quite the same pattern as in the United States. Strong demand in the end-use markets maintained relatively stable the prices of ammonium paratungstate which has increasingly been substituted for concentrates. APT materials were traded at between \$US 71 and \$US 73 per m.t.u. at the start of 1988 and ended the year at between \$US 77 and \$US 78 per m.t.u. Weaker demand and abundant supply had pushed prices from \$US 61 to \$US 62 per m.t.u. by the end of 1989, however. The APT market in Western Europe entered 1990 with further decreases. At the time of writing, ammonium paratungstate was being traded at between \$US 58 and \$US 59 per m.t.u. It may be noted that the price differences between the United States and Western Europe have considerably narrowed. Following the implementation of the Orderly Marketing Arrangement between China and United States, APT prices were higher by over \$US 17 per m.t.u. in the United States. At the time of writing the price differences were barely \$US 7 per m.t.u. higher.

68. Ferro-tungsten prices have also suffered from an over-supply of material in the market. In 1989, ferro-tungsten was traded at an average of \$US 5.20 per kg compared with \$US 5.64 per kg in 1988. At the beginning of 1989 the ferro-tungsten market opened with prices ranging between \$US 5.50 and \$US 5.70 per kg. The strong demand which had sustained the market began to weaken and ferro-tungsten prices started to slide, falling to as low as \$US 4.85 per kg towards the end of the third quarter of 1989. The market gained better control over supply early in 1990. At the spring session of the Canton Fair, low-pitched offers were reportedly quickly snapped up. Ferro-tungsten was traded recently at between \$US 5.50 and \$US 5.60 per kg compared to \$US 5.15 and \$US 5.25 per kg at the beginning of 1990.

69. Both tungsten powder and tungsten carbide have equally been affected by the price decreases. Tungsten powder was recently available at \$US 17.39 per kg compared to \$US 19.54 per kg in 1989. As regards tungsten carbide powder, in 1990 the one-micron grade was available at \$US 18.69 per kg according to the Metal Bulletin, as compared to \$US 19.00 per kg at the same period a year earlier.

## Chapter V

### THE SHORT-TERM OUTLOOK IN THE TUNGSTEN MARKET

70. From the foregoing, the picture of the tungsten market is one still beset by over-supply, a problem that has persisted for a number of years. The present market situation is characterized by low prices, closed mines in many producing countries and idle plant capacities for intermediate products in several tungsten-consuming countries. The over-supply of tungsten materials has largely precluded making any major improvements in the market situation which had been expected following the demand upturns of 1987-1988. With recent economic slow-downs, the market faces a price collapse similar to that which seriously affected the tungsten industry in 1985 and 1986. Just how serious are the prospects of such a collapse depends greatly on the balance between demand and supply, which determines the size of over-supply in the market.

71. With regard to demand, the outlook points to little likelihood of any substantial improvement. Most recent forecasts anticipate slow-downs in the world major economies with growth rates expected at lower than those in the last three years of the previous decade. The demand generated for tungsten in the tungsten-consuming industries is likely to weaken. Unless new applications which generate a significant new demand are found (a remote prospect in the short-terms), the high demand for tungsten in the period 1987-1989 is unlikely to be sustained.

72. The relationship between demand for tungsten and world economic growth rates is assumed to be at a factor of one to two or one to three. Assuming a world economic growth rate of between 2.5 per cent to 3.0 per cent for the next few years, the increase of demand for tungsten would be about 1.0 per cent. Whether this "rule of the thumb" approach is valid as a forecasting tool is a moot point but it does indicate prospects for a low demand in the tungsten market, which appear to be confirmed by a large section of market opinion.

73. Demand could be further influenced by the effects of substitution and technological changes which affected tungsten consumption negatively in the 1980s. There is still room for further such negative effects on tungsten consumption. However, the effects of substitution and technological change are now expected to be less significant than in the 1980s. Progress in many areas of substitution and technological change, such as tool-coating techniques and the substitution of tungsten by other materials including ceramics and cermets, would likely occur gradually. Meanwhile, tungsten may benefit from its present relatively low prices to find new industrial applications.

74. Another likely negative influence on future demand for tungsten would be the level of military expenditure. In recent discussions, the world major powers have proposed substantial cuts in military budgets. Tungsten demand would be affected to the extent that these cuts reduce expenditures on armaments and military equipment which directly or indirectly impinge on tungsten consumption. However, recent cuts have involved relatively limited amounts, which may indicate that the full impact of any major proposed reduction in military expenditure may take time to materialize.

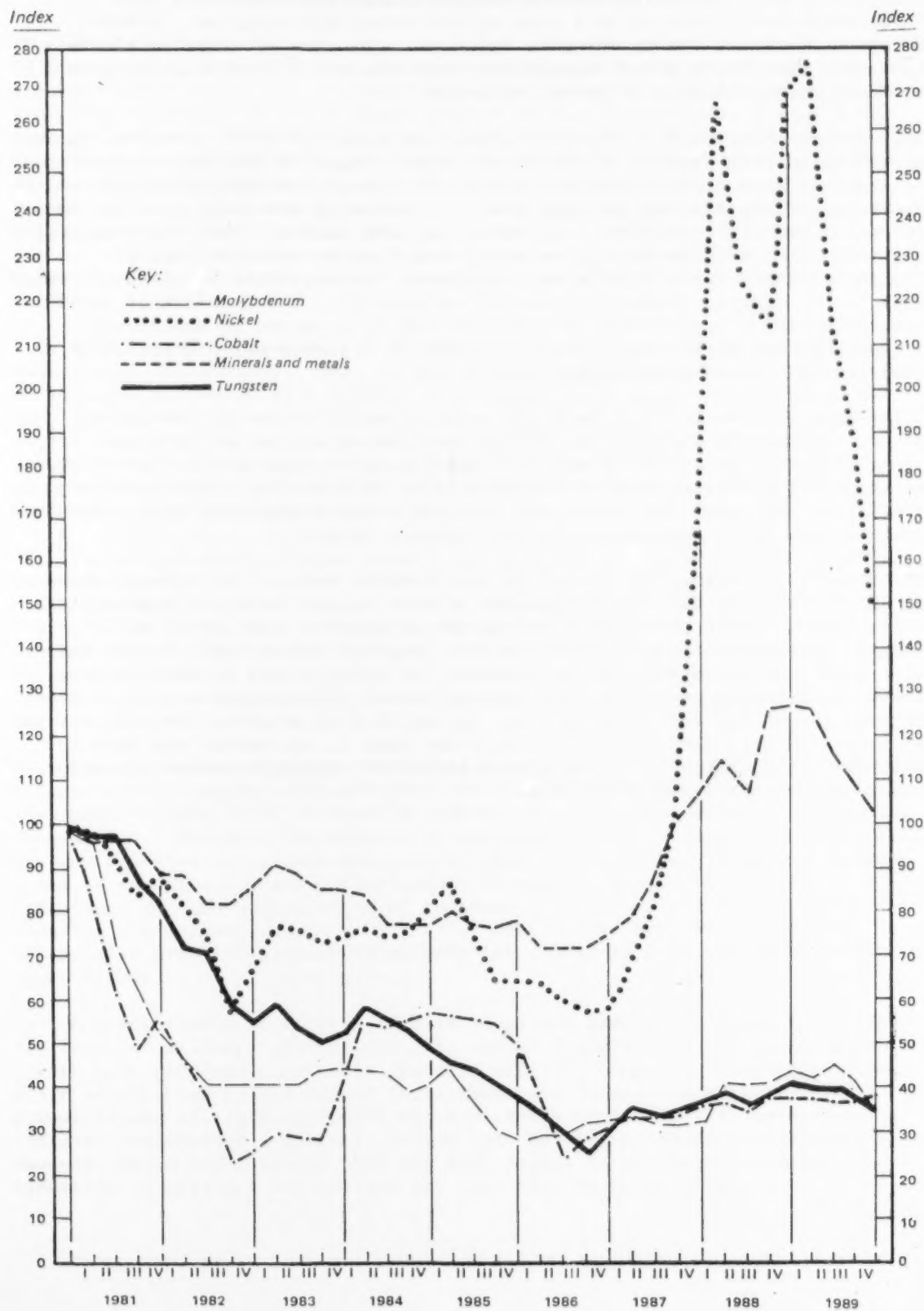
75. The cuts in military expenditure may be compensated, at least to some extent, by capital investments in the civilian sector or in development projects abroad, including Eastern Europe. When they take place such investments are likely to be a plus in the demand for tungsten. Eastern European countries can become more important consumers of tungsten if their economies experience a new impetus but there are still uncertainties about the resources available to these countries.

76. With at best demand rising at slower rates in the short term, the outlook for tungsten then depends on the supply side. The most important factor to determine future supply remains the availability of low-cost materials, which has expanded rapidly and has been the main source of over-supply in the market in recent years. Preliminary estimates for 1990 indicate that the over-supply situation is likely to worsen, owing to demand slow-downs and supply inelasticities. Faced with so much tungsten, the market is expected to remain weak for as long as production exceeds consumption. The decrease of market absorption while supply remains plentiful may be expected to exacerbate competition for market shares and to intensify pressure for protectionist measures in consuming countries.

77. There are two further factors also expected to influence the market situation from the supply side, namely the size of stocks and idle mine capacities. Large stocks of material have recently been accumulated in the market and the effects of such stocks will be negative for tungsten prices. Similarly, the large idle mine capacities in several producing countries would preclude any major improvement in the tungsten market.

78. The longer-term price prospects would depend much on the effectiveness of efforts to curb the large shipments of both concentrates and intermediate products which have seriously strained the absorption capacity of market demand. A recent forecast indicates that tungsten prices would be unlikely to attain \$US 100 per m.t.u. for many years. At present this forecast sounds quite unrealistic, given the fact that prices of concentrates are currently between \$US 40 and \$US 60 per m.t.u. In the absence of effective measures to achieve a better balance between supply and demand, the market may have to wait until the sources of cheap supply have been exhausted before any major price improvement could be achieved.

Figure 1  
COMPARISON BETWEEN TUNGSTEN AND SELECTED MINERAL AND METAL PRICES  
(First quarter 1981 = 100)



Source : UNCTAD secretariat and Metal Bulletin

Notes

- 1/ Refer to "Developed countries spending dips", based on Stockholm International Peace Research Institute Report, Financial Times, 22 May 1990, page 2.
- 2/ See Report of the Committee on Tungsten on its twenty-first session, TD/B/C.1/TUNGSTEN/82, paragraph 36.
- 3/ Estimates based on China Tungsten Industry News, published by the China Tungsten Industry Association, 31 March, 1990.
- 4/ Dr. B.F. Kieffer, Recycling systems with particular reference to the zinc process, Proceedings of the Second International Tungsten Symposium, San Francisco, June 1982, pp. 102-114.
- 5/ Christopher Munford, Tungsten shipments move out, American Metal Market, 13 February, 1990, pp. 2 and 16.
- 6/ For more details on the anti-dumping duties recently imposed by the EEC, see paragraphs 57-58 at the end of chapter III.
- 7/ The translation appears, for example, in "Antimony dances to China's tune", by Melanie Lovatt, in Metal Bulletin Monthly, May 1990, p. 28.
- 8/ Refer to document TD/B/C.1/299, p. 32.
- 9/ Mineral Industry Surveys, Tungsten in June 1989, published by the United States Bureau of Mines.
- 10/ A Bimonthly Survey, Minerals and Materials, April-May 1989, the Bureau of Mines, the United States Department of the Interior, p. 26.
- 11/ Definitions of mine capacities as used by the United States Bureau of Mines are provided in the footnotes of this annex.
- 12/ The main provisions in the Orderly Marketing Agreement are summarized in American Metal Week of 28 September 1987 and Metal Bulletin of 1 October 1987.
- 13/ As provided in the report, "Chinese say EC tungsten duty 'unfair'", Metal Bulletin, 23 April 1990, p. 17.
- 14/ See Canton Fair starts with a whimper, Metal Bulletin, 23 October 1989, p. 21.
- 15/ At the meeting of producing-exporting countries in Changsha (China), a proposal was made to base the APT price on the following formula:

$$\text{APT price} = \frac{\text{Wolfram price}}{0.9} + (\text{Wolfram price} \times 0.25).$$

Annex I

Economic growth rates and forecasts in selected countries, 1982-1990 a/

| Country/region                         | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | Forecast<br>1990 |
|----------------------------------------|------|------|------|------|------|------|------|------|------------------|
| World economy                          | 0.4  | 2.1  | 4.2  | 3.5  | 3.0  | 3.5  | 4.3  | 3.7  | 3.0              |
| Developed market-<br>economy countries | -0.2 | 2.4  | 4.5  | 3.4  | 2.7  | 3.4  | 4.2  | 3.5  | 2.9              |
| France                                 | 1.8  | 0.7  | 1.6  | 1.9  | 2.2  | 1.9  | 3.4  | 3.4  | 3.1              |
| Germany,<br>Fed.Rep.of                 | -1.0 | 1.5  | 3.0  | 2.0  | 2.4  | 1.7  | 3.6  | 4.3  | 3.7              |
| Japan                                  | 3.1  | 3.2  | 5.1  | 4.6  | 2.5  | 4.2  | 5.7  | 4.8  | 4.5              |
| Sweden                                 | 0.8  | 2.5  | 3.0  | 2.5  | 1.7  | 2.8  | 2.5  | 2.1  | 1.2              |
| United Kingdom                         | 1.5  | 3.5  | 2.9  | 3.7  | 3.5  | 4.7  | 4.2  | 2.3  | 1.3              |
| United States                          | -2.5 | 3.5  | 6.5  | 3.8  | 2.8  | 3.7  | 4.4  | 3.0  | 2.3              |
| Developing countries                   | 1.4  | 1.8  | 3.0  | 2.3  | 2.7  | 3.2  | 3.8  | 2.9  | 3.1              |
| Republic of Korea                      | 5.7  | 11.8 | 9.4  | 6.9  | 12.4 | 11.8 | 11.3 | 6.1  | 6.3              |
| Countries of<br>Eastern Europe b/      | 3.0  | 4.2  | 3.5  | 3.2  | 4.3  | 2.6  | 4.0  | 1.8  | ...              |
| USSR                                   | 4.0  | 4.2  | 2.9  | 3.5  | 4.1  | 2.3  | 4.4  | 2.4  | 4.4 c/           |
| China b/                               | 7.2  | 7.1  | 7.9  | 12.3 | 7.4  | 9.4  | 11.0 | 4.0  | 5.3              |

Source: Trade and Development Report, UNCTAD, recent issues; Handbook of International Trade and Development Statistics, UNCTAD, recent issues; The 1989 Report on the World Social Situation, (E/C.N.5/1989/2); World Economic Survey, United Nations (New York), recent issues; World Economic Outlook, IMF, recent issues; Main Economic Indicators, OECD, recent issues; Economic Survey of Europe, 1989-1990, ECE; National Economy USSR, recent issues; and Council of Mutual Economic Assistance (CMEA), recent issues.

a/ Refers to Real gross domestic product or gross national product, unless otherwise specified.

b/ Net material product.

c/ Planned growth rate.

Annex II

Consumption of tungsten ores and concentrates, 1980-1989  
(Metric tons of tungsten content)

|                                        | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     | 1986    | 1987    | 1988     | 1989     | 1990 a/ |
|----------------------------------------|----------|----------|----------|----------|----------|----------|---------|---------|----------|----------|---------|
| World<br>of which:                     | 49,289   | 47,305   | 40,189   | 40,175   | 47,775   | 45,328   | 42,806  | 45,107  | 46,722   | 48,156   | 48,000  |
| Developed market-<br>economy countries | 21,746   | 19,381   | 12,579   | 13,684   | 20,209   | 17,172   | 13,686  | 14,567  | 16,476   | 14,575   |         |
| Austria                                | 2,321    | 1,850    | 1,304    | 1,629    | 2,096    | (2,000)  | (2,000) | (2,000) | (2,100)  | (1,800)  |         |
| France                                 | 841      | 663      | 653      | 520      | 815      | 808      | 677     | 269     | 34       | -        |         |
| Germany Fed. Rep. of                   | 1,499    | 1,348    | 1,541    | 2,030    | 3,934    | 2,073    | 1,720   | 1,863   | 2,144    | 2,100    |         |
| Japan                                  | 2,931    | 2,238    | 1,826    | 1,977    | 2,302    | 2,616    | 2,145   | 2,116   | 1,980    | 1,539    |         |
| Netherlands                            | (400)    | (400)    | (300)    | (300)    | (300)    | (400)    | (350)   | (300)   | (330)    | (350)    |         |
| Sweden                                 | 2,155    | 1,432    | 994      | 774      | 765      | 820      | 855     | 567     | (550)    | (550)    |         |
| United Kingdom                         | 1,462    | 879      | 660      | 560      | 610      | (600)    | (580)   | (550)   | (575)    | (30)     |         |
| United States                          | 9,268    | 9,839    | 4,506    | 5,181    | 8,577    | 6,838    | 4,804   | 5,506   | 7,832    | 7,711    | (7,250) |
| Others                                 | 869      | 732      | 795      | 713      | 810      | 1,017    | 555     | 1,396   | 931      | 495      |         |
| Developing countries                   | 2,348    | 2,897    | 2,698    | 2,318    | 2,872    | 3,453    | 2,956   | 3,196   | 2,622    | 3,281    |         |
| Brazil                                 | 556      | 480      | 454      | 450      | 538      | 1,048    | 672     | 867     | (753)    | (688)    |         |
| India                                  | 299      | 459      | 454      | 250      | 157      | 250      | (230)   | (250)   | (250)    | (250)    |         |
| Republic of Korea                      | 1,434    | 1,898    | 1,742    | 1,555    | 2,070    | 2,048    | 1,987   | 1,950   | 1,580    | (2,300)  |         |
| Others                                 | 59       | 60       | 48       | 63       | 107      | 107      | 67      | 129     | 39       | 43       |         |
| Countries<br>of Eastern Europe         | (19,095) | (18,627) | (19,312) | (19,173) | (18,694) | (17,703) | 18,364  | 18,844  | (17,124) | (16,800) |         |
| Socialist countries<br>of Asia         | (6,100)  | (6,400)  | (5,600)  | (5,000)  | (6,000)  | (7,000)  | (7,800) | (8,500) | (10,500) | (13,500) |         |

Source: UNCTAD secretariat, based on Quarterly Bulletin of Tungsten Statistics, Committee on Tungsten, various issues.

a/ Provisional estimates.

Brackets ( ) denote estimates of apparent consumption.

Annex III

Production of tungsten ores and concentrates, 1980-1990  
(Metric tons of tungsten content)

|                                    | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     | 1986     | 1987     | 1988     | 1989     | 1990 a/  |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| World of which:                    | 52,112   | 50,670   | 48,038   | 42,980   | 50,763   | 49,239   | 46,264   | 40,980   | 46,154   | 49,240   | 49,000   |
| Developed market-economy countries | 14,607   | 14,080   | 12,213   | 8,248    | 12,142   | 11,388   | 9,027    | 4,322    | 5,254    | 5,323    |          |
| Australia                          | 3,316    | 3,333    | 2,588    | 2,061    | 1,733    | 1,970    | 1,572    | 1,152    | 1,261    | (1,350)  |          |
| Austria                            | 1,495    | 1,450    | 1,406    | 1,408    | 1,632    | 1,481    | 1,387    | (1,250)  | 1,507    | (1,500)  |          |
| Canada                             | 3,178    | 2,052    | 2,938    | 328      | 3,715    | 3,005    | 1,273    | -        | -        | -        | -        |
| France                             | 577      | 591      | 726      | 793      | 742      | 735      | 937      | -        | -        | -        | -        |
| Japan                              | 857      | 787      | 763      | 605      | 649      | 566      | 576      | 258      | 335      | 373      |          |
| Portugal                           | 1,580    | 1,396    | 1,359    | 1,182    | 1,509    | 1,766    | 1,657    | 1,209    | 1,381    | 1,377    | (1,440)  |
| Spain                              | 451      | 441      | 556      | 521      | 569      | 482      | 483      | 80       | 80       | 58       | (60)     |
| Sweden                             | 327      | 365      | 349      | 365      | 385      | 402      | 357      | 334      | 325      | (180)    | -        |
| United States                      | 2,754    | 3,605    | 1,521    | 980      | 1,203    | 936      | 780      | 34       | 360      | (450)    | (340)    |
| Others                             | 72       | 60       | 7        | 5        | 5        | 5        | 5        | 5        | 5        | 35       |          |
| Developing countries               | 9,925    | 10,110   | 9,645    | 8,452    | 9,071    | 8,301    | 6,687    | 5,608    | 5,850    | 5,867    |          |
| Bolivia                            | 2,661    | 2,778    | 2,534    | 2,490    | 1,893    | 1,643    | 1,160    | 624      | 924      | 1,118    | (1,200)  |
| Brazil                             | 875      | 1,248    | 1,365    | 1,026    | 1,101    | 1,297    | 875      | 672      | 739      | (790)    | (830)    |
| Korea, Republic of                 | 2,607    | 2,742    | 2,539    | 2,101    | 2,702    | 2,370    | 2,240    | 2,180    | 1,825    | 1,922    | (1,500)  |
| Mexico                             | 211      | 158      | 78       | 147      | 145      | 282      | 294      | 213      | 206      | (171)    | (180)    |
| Myanmar, The Union of              | 476      | 825      | 844      | 930      | 1,096    | 945      | 715      | 493      | (400)    | (400)    |          |
| Peru                               | 617      | 521      | 654      | 703      | 786      | 732      | 604      | 440      | 545      | 265      | (335)    |
| Thailand                           | 1,615    | 1,210    | 856      | 563      | 742      | 585      | 512      | 702      | 651      | 648      | (670)    |
| Viet Nam                           | -        | -        | -        | -        | -        | -        | -        | -        | (300)    | (300)    | (300)    |
| Other                              | 863      | 628      | 775      | 492      | 606      | 447      | 287      | 284      | 260      | 253      |          |
| Countries of Eastern Europe        | (8,880)  | (9,280)  | (9,480)  | (9,780)  | (10,050) | (10,050) | (9,050)  | (9,050)  | 7,550    | (7,550)  | (7,550)  |
| Socialist countries of Asia        | (18,700) | (17,200) | (16,700) | (16,500) | (19,500) | (19,500) | (21,500) | (22,000) | (27,500) | (30,500) | (30,500) |

Source: UNCTAD secretariat, Quarterly Bulletin of Tungsten Statistics, Committee on Tungsten, various issues.

a/ Provisional estimates.

Annex IV

Number of tungsten mines in operation, 1980 and 1989

| Country                                   | 1980 | 1989 a/ |
|-------------------------------------------|------|---------|
| <u>Developed market-economy countries</u> |      |         |
| Australia                                 | 4    | 2       |
| Austria                                   | 1    | 1       |
| Canada b/                                 | 1    | -       |
| France                                    | 2    | -       |
| Japan                                     | 5    | 3       |
| Portugal                                  | 6    | 1       |
| Spain                                     | 8    | 1       |
| Sweden                                    | 1    | -       |
| United Kingdom                            | 1    | -       |
| United States                             | 30   | 2       |
|                                           | --   | --      |
| Total                                     | 59   | 10      |
|                                           | --   | --      |
| <u>Developing countries</u>               |      |         |
| Argentina                                 | 14   | 1       |
| Bolivia                                   | 6    | 8       |
| Brazil                                    | 7    | 3       |
| India                                     | 2    | 1       |
| Peru                                      | 2    | 2       |
| Korea, Rep.of                             | 10   | 1       |
| Rwanda                                    | 10   | -       |
| Thailand                                  | 17   | 13      |
| Turkey                                    | 1    | 1       |
|                                           | --   | --      |
| Total                                     | 69   | 30      |

Source: Diverse sources including Tungsten Statistics, the quarterly bulletin of the UNCTAD Committee on Tungsten; The Economics of Tungsten, 1986, Roskill Information Services; and International Journal of Refractory & Hard Metals, various issues.

a/ Refer to latest available data where such data are not available for 1989.

b/ There were only two main mines in Canada, namely Cantung and Mt. Pleasant, the latter mine having been opened only in 1983. Both mines are now shut down.

Annex V

Movements of tungsten stocks by type in selected countries, 1981-1989

|                                  | End of year  |              |              |              |              |              |              |              |              |
|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                                  | 1981         | 1982         | 1983         | 1984         | 1985         | 1986         | 1987         | 1988         | 1989         |
| <b>A. Ores and concentrates</b>  |              |              |              |              |              |              |              |              |              |
| <u>Producers' stocks</u>         |              |              |              |              |              |              |              |              |              |
| Australia                        | 552          | 507          | 385          | 306          | 379          | 481          | 435          | 416          | (800)        |
| Bolivia                          | ...          | ...          | ...          | ...          | ...          | ...          | ...          | (105)        | 130          |
| Brazil                           | -            | -            | 17           | 17           | 17           | 875          | ...          | 70           | (84)         |
| France                           | 43           | 139          | 159          | 76           | 85           | 205          | 65           | -            | -            |
| India                            | 7            | 21           | 11           | 32           | 54           | 50           | 50           | 57           | (55)         |
| Japan                            | 173          | 211          | 32           | 39           | 27           | 26           | 21           | 41           | 72           |
| Mexico                           | -            | 7            | 12           | 18           | 20           | 95           | 8            | 19           | (6)          |
| Peru                             | ...          | ...          | ...          | ...          | 46           | 241          | ...          | 71           | (54)         |
| Portugal                         | 301          | 380          | 370          | 251          | 305          | (1,042)      | (941)        | 969          | 1,057        |
| Republic of Korea                | 267          | 338          | 76           | 231          | (200)        | 44           | 45           | (45)         | (45)         |
| Rwanda                           | 29           | 30           | (40)         | 48           | ...          | (60)         | 1            | -            | -            |
| Spain                            | ...          | ...          | 75           | 114          | 84           | 50           | 62           | 47           | 45           |
| Thailand                         | 799          | 793          | 834          | 804          | 1,029        | 1,025        | (1,100)      | 1,295        | 1,538        |
| Turkey                           | 116          | 23           | 116          | 96           | 80           | 145          | 43           | 20           | ...          |
| United Kingdom                   | 102          | 73           | -            | -            | -            | -            | -            | -            | -            |
| United States                    | 108          | 54           | 54           | 46           | 60           | 21           | 21           | 21           | (40)         |
| Sub-total                        | 2,497        | 2,576        | 2,181        | 2,078        | 2,386        | 4,360        | 2,801        | 3,176        | 3,926        |
| <u>Consumers' stocks</u>         |              |              |              |              |              |              |              |              |              |
| Argentina                        | -            | 9            | -            | -            | -            | -            | -            | -            | -            |
| Canada                           | ...          | ...          | ...          | ...          | ...          | ...          | (255)        | 75           | ...          |
| France                           | 16           | 9            | 47           | 177          | 130          | 221          | -            | -            | -            |
| Japan                            | 460          | 409          | 511          | 557          | 671          | 687          | 448          | 455          | 561          |
| Portugal                         | 24           | 3            | 5            | 3            | 10           | 1            | -            | 1            | 1            |
| Sweden                           | ...          | ...          | ...          | 256          | 302          | 333          | 353          | ...          | ...          |
| United States                    | 672          | 1,765        | 1,085        | 959          | 1,077        | 502          | 329          | 223          | 1,261        |
| Sub-total                        | 1,172        | 2,195        | 1,648        | 1,952        | 2,190        | 1,744        | 1,385        | 754          | 1,822        |
| <u>Dealers' stocks</u>           |              |              |              |              |              |              |              |              |              |
| Argentina                        | 43           | 23           | 11           | (9)          | (9)          | -            | -            | -            | -            |
| Japan                            | 7            | -            | 11           | -            | 1            | -            | -            | -            | -            |
| Peru                             | ...          | ...          | ...          | ...          | ...          | ...          | ...          | 7            | 7            |
| Thailand                         | 379          | 530          | 462          | 339          | 113          | 116          | 120          | 51           | 56           |
| Sub-total                        | 429          | 553          | 484          | 348          | 123          | 116          | 120          | 58           | 63           |
| <u>Total (as shown above)</u>    | <u>4,098</u> | <u>5,324</u> | <u>4,313</u> | <u>4,378</u> | <u>4,699</u> | <u>6,220</u> | <u>4,306</u> | <u>3,988</u> | <u>5,811</u> |
| <b>B. Ammonium paratungstate</b> |              |              |              |              |              |              |              |              |              |
| United States a/                 | 1,649        | 748          | 870          | 1,191        | 1,056        | 477          | 292          | 911          | 909          |

Source: UNCTAD, Quarterly Bulletin of Tungsten Statistics, Committee on Tungsten, various issues and the Bureau of Mines, the United States Department of the Interior.

- a/ Consumers' and Producers' stocks only.  
- Denotes negligible or nil.  
... Denotes not available.  
( ) Provisional estimates.

Annex VI

DLA stockpile releases in relation to the total supply of tungsten concentrates in the United States, 1980-1990  
(Metric tons of contained tungsten)

|                                                                                                 | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1988  | 1989  | 1990 a/ |
|-------------------------------------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| A. DLA Stockpile release                                                                        | 1,703 | 958   | 344   | 259   | 1,368 | 902   | 301   | 708   | 458   | 466   | -       |
| B. Total supply of tungsten concentrates b/                                                     | 8,679 | 9,754 | 5,142 | 4,135 | 8,219 | 6,312 | 4,144 | 5,314 | 8,798 | 7,584 | ...     |
| C. DLA stockpile release as a proportion of total supply of tungsten concentrates (percentages) | 20    | 10    | 7     | 6     | 17    | 14    | 7     | 13    | 5     | 4     | -       |

Source: UNCTAD secretariat, based on data of the United States Bureau of Mines, the United States Department of the Interior.

Dash - denotes negligible or nil; three dots ... denote not available.

a/ Estimates.

b/ Equal to the total of production, imports minus exports, stock movements and DLA releases.

Annex VII

Mine production capacity by country  
(metric tons metal content)

|                                           | 1979 a/       | 1983          | 1984          | 1988          |
|-------------------------------------------|---------------|---------------|---------------|---------------|
| <u>Total world b/</u>                     | <u>49,500</u> | <u>57,500</u> | <u>58,000</u> | <u>59,000</u> |
| <u>Developed market-economy countries</u> | <u>14,250</u> | <u>18,850</u> | <u>19,350</u> | <u>14,360</u> |
| Australia                                 | 3,150         | 3,590         | 3,590         | 3,300         |
| Austria                                   | 1,200         | 2,200         | 2,200         | 1,600         |
| Canada                                    | 2,600         | 5,000         | 5,000         | 3,000         |
| France                                    | 600           | 750           | 750           | -             |
| Japan                                     | 800           | 500           | 500           | 600           |
| Portugal                                  | 1,300         | 1,400         | 1,400         | 1,400         |
| Spain                                     | 350           | 600           | 600           | 400           |
| Sweden                                    | 600           | 300           | 300           | 350           |
| United States                             | 3,600         | 4,500         | 5,000         | 3,700         |
| Other                                     | 50            | 10            | 10            | 10            |
| <u>Developing countries</u>               | <u>14,400</u> | <u>10,300</u> | <u>10,600</u> | <u>8,030</u>  |
| Bolivia                                   | 3,000         | 2,700         | 2,800         | 1,300         |
| Brazil                                    | 1,400         | 1,300         | 1,300         | 1,100         |
| Burma                                     | 700           | 1,000         | 1,100         | 500           |
| Korea, Republic of                        | 2,700         | 2,300         | 2,400         | 2,700         |
| Mexico                                    | 200           | 400           | 400           | 300           |
| Peru                                      | 500           | 800           | 800           | 700           |
| Rwanda                                    | 400           | 300           | 300           | 330           |
| Thailand                                  | 2,900         | 900           | 900           | 750           |
| Turkey                                    | 1,700         | 200           | 200           | 200           |
| Other                                     | 900           | 400           | 400           | 150           |
| <u>Countries of Eastern Europe</u>        | <u>8,700</u>  | <u>9,350</u>  | <u>9,350</u>  | <u>9,250</u>  |
| USSR                                      | 8,600         | 9,300         | 9,300         | 9,200         |
| Other                                     | 100           | 50            | 50            | 50            |
| <u>Socialist countries of Asia</u>        | <u>12,200</u> | <u>19,000</u> | <u>19,000</u> | <u>27,500</u> |
| China                                     | 10,000        | 17,000        | 17,000        | 25,000        |
| Other c/                                  | 2,200         | 2,000         | 2,000         | 2,500         |

Source: UNCTAD based mainly on The United States Bureau of Mines, the United States Department of the Interior.

a/ Figures rounded after conversion from pounds to metric tons.

b/ The figures may not add up to the total due to rounding.

c/ Refer to the Democratic Republic of Korea and Mongolia.

Notes: (i) The data shown are rated capacity for mines and mills. Rated capacity is defined as the maximum quantity of product that can be produced in a period of time on a normally sustainable long-term operating rate, based on the physical equipment of the plant, and given acceptable routine operating procedures involving labour, energy, materials, and maintenance. Capacity includes both operating plants and plants temporarily closed that can be brought into production within a short period of time with minimum capital expenditure.

(ii) Mine capacity for tungsten is based on published reports, maximum production statistics and estimates. Estimates are utilized particularly for the centrally planned economy countries where capacity information is either incomplete or unavailable.

An updated list of new tungsten mining projects

| Location                             | Project             | Company(ies)                          | Capacity<br>in tons W | Completion<br>date | Remarks                                                                                                                                                                                                                                   |
|--------------------------------------|---------------------|---------------------------------------|-----------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Australia                            | Burnie (Tasmania)   | Taminex/McIntyre                      | -                     | -                  | Project awaiting decision.                                                                                                                                                                                                                |
| Bolivia                              | Chicote Grande      | Anschutz Mining                       | 1,000 a/              | -                  | Project was due for completion in 1984-1985 but is halted.                                                                                                                                                                                |
| Brazil                               | Carajas             | Docog<br>(CVRD subsidiary)            | 100                   | -                  | Development under consideration.                                                                                                                                                                                                          |
| Canada<br>(Northwest<br>Territories) | Mactung             | Anmax                                 | 1,000-<br>3,500       | -                  | Originally commissioned for 1985 but postponed to 1987 and then further postponed, development awaiting market conditions to improve significantly.                                                                                       |
| China                                | Jiangxi             | State                                 | -                     | -                  | Project includes development of tungsten mines as well as lead, zinc and tin mines in the Jiangxi Province.                                                                                                                               |
| France<br>(Belfort)                  | Auxelles            | Elf-Aquitaine/<br>Cominco             | 500                   | -                  | Deferred (originally due for completion in 1984).                                                                                                                                                                                         |
| India                                | Degana Rajasthan    | Rajasthan Tungsten                    | 200 b/                | -                  | Project at proposal stage in 1988 but no further progress has since been reported.                                                                                                                                                        |
|                                      | Almora              | Uttar Pradesh<br>Development Corp.    | -                     | -                  | Reserves estimated at 10 metric tons with an ore grade of 0.4 per cent tungsten content; a pilot plant reported to have been established in 1989 and commercial working could start within four to five years.                            |
| Mongolia                             | Caganova            | Hungarian-owned<br>Company            | -                     | -                  | Little information is available other than the operation including both mining and dressing works; trial operations were reported begun on Sept. 10, 1988 at full capacity, the operation is expected to treat 36,000 mt of ore annually. |
| Peru                                 | Altiplano           | Minera Regina S.A.                    | 680 b/                | 1988-1989          | Expansion project (production of concentrates to increase to 2,700 metric tons per year); the completion date may have been extended.                                                                                                     |
| South Africa<br>(Cape Province)      | Upington            | Shell                                 | 600 a/                | -                  | Completion date originally fixed for 1984 following a full scale feasibility study after discovery of deposits in 1982, but the project has continued to be put in abeyance.                                                              |
| Spain<br>(Salamanca)                 | Los Santos          | Banco Bilbao/<br>Billiton BV          | 500 c/                | -                  | High grade deposits discovered in 1983 with reserves estimated at 1 m tons of ores grading 28 kg W per ton enough for 10 and 13 years' exploitation; developments awaiting improved market conditions.                                    |
| Thailand                             | Doi Mek             | Thai-Swedish Mining                   | 340                   | -                  | Expansion (under consideration).                                                                                                                                                                                                          |
| United Kingdom                       | Hemerdon<br>(Devon) | Anmax/Hemerdon<br>Mining and Smelting | 2,200                 | -                  | Planning permission was granted at the end of 1985 but development has been postponed.                                                                                                                                                    |

Source: UNCTAD secretariat, based on annex VI of TD/B/C.1/TUNGSTEN/80 as revised, and information provided by direct contacts and a number of periodicals, including Mining Magazine and Engineering and Mining Journal, recent issues.

Note: The information provided in the list may not be complete; Committee members are invited to provide additional information which may be available to them for updating or completing this table.

a/ Estimates by the UNCTAD secretariat. b/ Capacity refers to tons of ore per day. c/ Maximum estimate. - Denotes data not available.

Annex IX

World exports and imports of tungsten ores and concentrates  
1984-1989

(metric tons of tungsten content)

|                                    | 1984          | 1985          | 1986          | 1987          | 1988          | 1989          |
|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>A. World Exports</b>            | <u>26,513</u> | <u>27,079</u> | <u>23,782</u> | <u>22,953</u> | <u>23,789</u> | <u>24,800</u> |
| Developed market-economy countries | 8,280         | 7,885         | 4,833         | 3,137         | 3,733         | 3,100         |
| Developing countries               | 7,020         | 6,747         | 5,283         | 6,400         | 4,941         | 4,700         |
| Socialist countries                | 11,213        | 12,447        | 13,666        | 13,416        | 15,115        | 17,000        |
| <b>B. World Imports</b>            | <u>26,931</u> | <u>25,135</u> | <u>21,448</u> | <u>20,986</u> | <u>24,981</u> | <u>24,300</u> |
| Developed market-economy countries | 15,820        | 12,752        | 8,636         | 9,541         | 13,784        | 13,400        |
| Developing countries               | 1,467         | 3,228         | 2,998         | 1,651         | 1,623         | 1,600         |
| Socialist countries                | 9,644         | 9,155         | 9,814         | 9,794         | 9,574         | 9,300         |
| <b>C. World balance (A-B)</b>      | -418          | +1,944        | +2,334        | +1,967        | -1,192        | +500          |

Source: UNCTAD secretariat, on the basis of Tungsten Statistics of the Committee on Tungsten.

